

Remarks

Claims 1-20 are pending in this application. Claims 1-20 have been rejected. Applicant has amended claims 1, 5-7, 10, 12-15, and 20. Reconsideration and reexamination of this application as amended, are respectfully requested.

Claim 20 has been rejected under 35 U.S.C. § 112, second paragraph. Regarding claim 20, Applicant has amended claim 20 to read as a dependent claim from claim 15.

The claimed invention is a real-time maintenance alert system for use in a heavy duty truck having an engine, and an engine controller having a communications data link. The system comprises a sensor operative to produce a signal indicative of at least one engine condition from the group consisting of: an oil filter restriction condition, a fuel filter restriction condition, an air filter restriction condition, an oil level, and a coolant level in a coolant reserve tank. Control logic at the engine controller is configured to process the sensor signal and to determine a real-time fault condition when the engine condition falls outside of a predetermined acceptable range. The control logic is operative to produce an output signal at the data link in response to the real-time fault condition. In accordance with the claimed invention, a display device has memory and is configured to transmit and receive information over the data link. The display device processes the output signal and stores a fault condition status in the memory. The display device has an indicator operative to alert a user of the real-time fault condition.

Advantageously, in the claimed invention, one or more maintenance alert sensors produces an output signal that is processed by control logic in the engine controller. The control logic processes the sensor outputs, and sends an output signal over the data link in response to a real-time fault condition. The display device is an intelligent device having memory and is configured to communicate over the data link, and store the fault condition status in the memory. Because the claimed invention utilizes a communication data link of the

engine controller, the claimed invention has many advantages over the prior art. For example, in addition to displaying maintenance alert information, the display device may be configured to display periodic maintenance information or engine protection information when such information is available from the engine controller over the data link. As such, the intelligent display device having memory utilized in the claimed invention is more versatile than the prior art relied upon by the Examiner.

The Examiner has rejected claims 1 and 2 as being anticipated by Betts, Jr. et al. and has rejected claims 3 and 4 as being obvious over Betts, Jr. et al. Betts, Jr. et al. utilizes a sensor to detect a clogged air filter. In the presence of a clogged air filter, maximum available engine power is reduced. Further, a clogged filter signal is supplied to a warning indicator 46 (Figure 1). As shown in Figure 1, indicator 46 is a simple indicator light that is connected to engine controller 32. In contrast, the claimed invention utilizes an intelligent display device having memory and configured to transmit and receive information over the engine controller data link. Utilization of an intelligent display device that communicates over the data link provides a more versatile system capable of displaying information regarding additional engine diagnostics. Because Betts, Jr. et al. does not show or suggest a display device having a memory and configured to transmit and receive information over the engine controller data link, Applicant believes that claim 1 is patentable. It is unobvious to modify Betts, Jr. et al. because there is no motivation to replace indicator lamp 46 with a display device having more enhanced functionality including memory and the ability to communicate over an ECM data link.

Regarding claim 2, although Betts, Jr. et al. sets forth that the preselected threshold is empirically determined in accordance with the engine being used, Betts, Jr. et al. does not show or suggest that the threshold is a function of engine RPM. Regarding claims 3 and 4, Betts, Jr. et al. only vaguely sets forth that the threshold is based on the engine, and there is no showing or suggestion of a specific threshold value. As such, it is unobvious to determine a threshold as set forth in both claim 3 and claim 4.

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Regarding the rejection of claims 5 and 6 as being unpatentable over Balzer, Balzer is an indicator system suitable for indicating a defective fluid filter. Although Balzer describes a sensor and indicator, Balzer fails to describe or suggest a display device having a memory and configured to transmit and receive information over the engine controller data link. In accordance with the present invention, the intelligent display device communicates over the engine controller data link, which is far different than the sensor and indicator arrangement in Balzer.

Regarding the rejection of claim 5 as being unpatentable over Hart et al., Hart et al. also fails to describe or suggest a display device having a memory and configured to transmit and receive information over the engine controller data link. It is not obvious to utilize an engine controller data link with a display device having memory. Regarding the rejection of claim 6 as being unpatentable over Mouton, Mouton is yet another apparatus for detecting a faulty fluid filter. Like the other references relied upon by the Examiner, Mouton also fails to describe or suggest a display device having a memory and configured to transmit and receive information over the engine controller data link. Regarding the rejection of claim 7 as being unpatentable over Bowman, Bowman is still another system with a sensor and indicator but lacking a display device having a memory and configured to transmit and receive information of the engine controller data link. Regarding claims 8 and 9, Niemczyk et al. fails to provide the elements of claim 7 that Bowman is lacking, and as such, claims 7-9 are all believed to be patentable.

In all of these references, each reference fails to describe the claimed display device having a memory and that communicates over the engine controller data link. Some of these references, as acknowledged by the Examiner, fail to disclose an engine controller. In the claimed invention, Applicant has recognized that providing an intelligent display device with memory that utilizes the engine controller data link, maintenance alert information may be displayed to the operator and in addition, because the data link is connected to the display device, other information may be provided as desired, including periodic maintenance information and shut down logic information as also claimed by Applicant. None of the references describe or suggest the claimed invention.

Regarding the rejection of claims 10 and 11 as being unpatentable over Trobert, Trobert is yet another reference that describes sensors connected to an indicator, but fails to describe a display device having a memory and configured to transmit and receive information over the engine controller data link. In Trobert, the engine controller is not involved in the alert system. Applicants have recognized that providing an enhanced display device with memory and configured to transmit and receive information over the engine controller data link has many advantages, and believes the claimed invention to be patentable over the prior art of record.

The Examiner has rejected claims 12-20 as being unpatentable over Harazoe et al. Harazoe et al. describes various normally closed sensor switches connected to a circuit and to an alarm. Again, like many of the other references, Harazoe et al. does not describe a display device having a memory, and does not describe a display device configured to transmit and receive information over the engine controller data link. Harazoe et al. is far different than the claimed invention. Specifically, regarding claim 12, Harazoe et al. does not describe control logic at the engine controller or the display device having memory and receiving information over the data link. Regarding claim 13, Harazoe et al. does not describe processing the signal with control logic at the engine controller and receiving the output signal over the data link at a display device having a memory, and storing a fault condition status in the memory. Claim 15 depends from claim 13 and is also believed to be patentable. Regarding claim 15, the claimed invention recites a display device having a memory for storing a fault condition status based on the output signal. Further, the control logic at the engine controller communicates with the display device interface over the data link. This is far different than Harazoe et al.

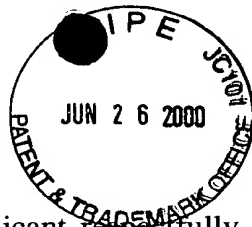
Regarding claim 16, the claimed invention integrates the display device maintenance alert system with the engine protection control logic of the engine controller in accordance with the claimed invention, because the display device communicates over the engine controller data link, an engine protection indicator on the display device may produce a visual indicator when an engine protection fault condition is received at the interface. None of the references relied upon by Examiner show a display device and communicates over the



engine controller data link, and it is not possible to provide engine protection information as recited in claim 16 in any of the references. Similarly, claim 17 recites a periodic maintenance indicator producing a visual indication when the output signal corresponding to the periodic maintenance fault condition is received at the interface. Because the display device of the present invention communicates over the engine controller data link, it is possible to provide periodic maintenance information to the display device. Regarding claims 18-20 these claims are dependent upon claim 15 and are also believed to be patentable over the prior art of record.

For reasons discussed above, Applicant maintains that none of the prior art references describe or suggest a display device with memory and configured to transmit and receive information over the engine controller data link. Utilizing the engine controller data link for a maintenance alert system has many advantages that were not recognized by the prior art. Specifically, the prior art includes sensors wired directly to indicator lamps through basic circuits, and does not describe or suggest utilizing the engine controller data link to allow or, in addition to maintenance alert information, enhanced diagnostic information to be sent to the display device such as periodic maintenance information and engine shut down indications.

Together with this reply, Applicant has submitted a Proposed Drawing Change to correct erroneous reference numbers in Figure 5. The reference numbers are correctly recited in the written description, and as such, the correction to the drawing presents no new matter to this application. Upon approval by the Examiner of the proposed change to Figure 5, Applicant will transmit formal drawings for this case including the proposed amendment therein.



Applicant respectfully requests that the Examiner allow claims 1-20. If a telephone call to the undersigned may expedite allowance, such a call is invited at (248) 226-2791.

Respectfully submitted,
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